

There is also provided a clean copy of Claim 20 and Claims 42-51 dependent therefrom. The dependent Claims 42-51 substantially correspond to former dependent Claims 21-29.

17. A glass substrate for a flat panel liquid-crystal display, such as for a laptop computer, the flat panel liquid-crystal display including a twisted nematic display, a supertwisted nematic display, an active matrix liquid-crystal display, a thin film transistor display, and a plasma addressed liquid-crystal display, said substrate comprising:

an alkali-free aluminoborosilicate glass;

said glass having a coefficient of thermal expansion  $\alpha_{20/300}$  of between  $2.8 \times 10^{-6}/K$  and  $3.8 \times 10^{-6}/K$ ;

said glass having the composition (in % by weight, based on oxide):

SiO <sub>2</sub>	> 58 - 64.5
B <sub>2</sub> O <sub>3</sub>	> 6 - 10.5
Al <sub>2</sub> O <sub>3</sub>	> 18 - 24
MgO	0 - < 3
CaO	1 - < 8
SrO	0.1 - 1.5
BaO	> 5 - 8
with SrO + BaO	< 8.5
with MgO + CaO + SrO + BaO	8 - 18
ZnO	0.1 - < 2;

said glass being configured to be resistant to thermal shock;

said glass being configured to have a high transparency over a broad spectral range in the visible and ultra violet ranges; and

said glass being configured to be free of bubbles, knots, inclusions, streaks, and surface undulations.

20. A glass comprising:  
a substantially alkali-free aluminoborosilicate glass;  
said glass having a coefficient of thermal expansion  $\alpha_{20/300}$  of  
between  $2.8 \times 10^{-6}/K$  and  $3.8 \times 10^{-6}/K$ ;  
said glass having the composition (in % by weight, based on  
oxide):

<chem>SiO2</chem>	> 58 - 65
<chem>B2O3</chem>	> 6 - 10.5
<chem>Al2O3</chem>	> 14 - 25
<chem>MgO</chem>	0 - < 3
<chem>CaO</chem>	0 - 9
<chem>SrO</chem>	0.1 - 1.5
<chem>BaO</chem>	> 5 - 8.5
with <chem>SrO</chem> + <chem>BaO</chem>	$\leq 8.6$
with <chem>MgO</chem> + <chem>CaO</chem> + <chem>SrO</chem> + <chem>BaO</chem>	8 - 18
<chem>ZnO</chem>	0.1 - < 2.

34. The glass substrate according to Claim 17, wherein:  
said glass substrate comprises a glass having a content of at  
least 0.1% by weight of ZnO.

35. The glass substrate according to Claim 34, wherein:  
said glass substrate comprises a glass having a glass transition  
temperature,  $T_g$ , of more than 700 degrees Celsius to maximize heat

resistance of said glass substrate.

36. The glass substrate according to Claim 35, wherein:  
said glass substrate comprises a glass having (i.) and (ii.),  
wherein (i.) and (ii.) are:

- (i.) a processing temperature,  $V_A$ , of at most 1350 degrees Celsius at a viscosity of  $10^4$  dPas; and
- (ii.) a temperature of at most 1720 degrees Celsius at a viscosity of  $10^2$  dPas.

37. The glass substrate according to Claim 36, wherein:  
said glass substrate comprises a glass having a content of more than 8% by weight of  $B_2O_3$ .

38. The glass substrate according to Claim 37, wherein:  
said glass substrate comprises a glass having a content of one of: at least 18% by weight of  $Al_2O_3$ , more than 18% by weight of  $Al_2O_3$ , at least 20.5% by weight of  $Al_2O_3$ , and at least 21.5% by weight of  $Al_2O_3$ .

39. The glass substrate according to Claim 38, wherein:  
said glass substrate comprises a glass containing additionally (in % by weight):

$ZrO_2$	0 - 2
$TiO_2$	0 - 2
with $ZrO_2 + TiO_2$	0 - 2
$As_2O_3$	0 - 1.5

$Sb_2O_3$	0 - 1.5
$SnO_2$	0 - 1.5
$CeO_2$	0 - 1.5
$Cl^-$	0 - 1.5
$F^-$	0 - 1.5
$SO_4^{2-}$	0 - 1.5

with  $As_2O_3 + Sb_2O_3 + SnO_2 + CeO_2$   
 $+ Cl^- + F^- + SO_4^{2-} \leq 1.5.$

40. The glass substrate according to Claim 39, wherein:  
said glass substrate comprises a glass in which arsenic oxide,  
antimony oxide, and inherent impurities are minimized.

41. The glass substrate according to Claim 17, comprising at least one of (a.), (b.), (c.), (d.), (e.), (f.), (g.), (h.), and (i.), wherein (a.), (b.), (c.), (d.), (e.), (f.), (g.), (h.), and (i.) comprise:

(a.) a glass transition temperature,  $T_g$ , of more than 700 degrees Celsius to maximize heat resistance of said glass substrate;

(b.) a glass having (i.) and (ii.), wherein (i.) and (ii.) are:

(i.) a processing temperature,  $V_A$ , of at most 1350 degrees Celsius at a viscosity of  $10^4$  dPas; and

(ii.) a temperature of at most 1720 degrees Celsius at a viscosity of  $10^2$  dPas;

(c.) more than 8% by weight of  $B_2O_3$ ;

(d.) one of: at least 18% by weight of  $Al_2O_3$ , more than 18% by weight of  $Al_2O_3$ , at least 20.5% by weight of  $Al_2O_3$ , and at least 21.5% by weight of  $Al_2O_3$ ;

(e.) at least 0.1% by weight of ZnO;

(f.) additionally (in % by weight):

$\text{ZrO}_2$  0 - 2

$\text{TiO}_2$  0 - 2

with  $\text{ZrO}_2 + \text{TiO}_2$  0 - 2

$\text{As}_2\text{O}_3$  0 - 1.5

$\text{Sb}_2\text{O}_3$  0 - 1.5

$\text{SnO}_2$  0 - 1.5

$\text{CeO}_2$  0 - 1.5

$\text{Cl}^-$  0 - 1.5

$\text{F}^-$  0 - 1.5

$\text{SO}_4^{2-}$  0 - 1.5

with  $\text{As}_2\text{O}_3 + \text{Sb}_2\text{O}_3 + \text{SnO}_2 + \text{CeO}_2$

$+ \text{Cl}^- + \text{F}^- + \text{SO}_4^{2-} \leq 1.5$ ;

(g.) a glass in which arsenic oxide, antimony oxide, and inherent impurities are minimized;

(h.) a float glass; and

(i.) one of (I.) and (II.):

(I.) a coefficient of thermal expansion  $\alpha_{20/300}$  of from  $2.8 \times 10^{-6}/\text{K}$  to  $3.6 \times 10^{-6}/\text{K}$ ; and

(II.) a density,  $\rho$ , of  $< 2.600 \text{ g/cm}^3$ .

42. The glass according to Claim 20, wherein:

said glass comprises at least 0.1% by weight of ZnO.

43. The glass according to Claim 42, wherein:

said glass has a glass transition temperature,  $T_g$ , of  $> 700^\circ\text{C}$  to

maximize heat resistance of said glass.

44. The glass according to Claim 43, wherein:  
said glass has (i.) and (ii.), wherein (i.) and (ii.) are:  
(i.) a processing temperature,  $V_A$ , of  $\leq 1350^{\circ}\text{C}$  at  $10^4$  dPas;  
and  
(ii.) a temperature of  $\leq 1720^{\circ}\text{C}$  at  $10^2$  dPas.

45. The glass according to Claim 44, wherein:  
said glass is configured to be resistant to thermal shock;  
said glass is configured to have a high transparency over a  
broad spectral range in the visible and ultra violet ranges; and  
said glass is configured to be free of bubbles, knots, inclusions,  
streaks, and surface undulations.

46. The glass according to Claim 45, wherein:  
said glass comprises more than 8% by weight of  $\text{B}_2\text{O}_3$ .

47. The glass according to Claim 46, wherein:  
said glass comprises one of (i.), (ii.), (iii.), and (iv.):  
(i.) at least 18% by weight of  $\text{Al}_2\text{O}_3$ ;  
(ii.) more than 18% by weight of  $\text{Al}_2\text{O}_3$ ;  
(iii.) at least 20.5% by weight of  $\text{Al}_2\text{O}_3$ ; and  
(iv.) at least 21.5% by weight of  $\text{Al}_2\text{O}_3$ .

48. The glass according to Claim 47, wherein:  
said glass additionally comprises (in % by weight):

$\text{ZrO}_2$  0 - 2  
 $\text{TiO}_2$  0 - 2  
with  $\text{ZrO}_2 + \text{TiO}_2$  0 - 2  
 $\text{As}_2\text{O}_3$  0 - 1.5  
 $\text{Sb}_2\text{O}_3$  0 - 1.5  
 $\text{SnO}_2$  0 - 1.5  
 $\text{CeO}_2$  0 - 1.5  
 $\text{Cl}^-$  0 - 1.5  
 $\text{F}^-$  0 - 1.5  
 $\text{SO}_4^{2-}$  0 - 1.5; and  
with  $\text{As}_2\text{O}_3 + \text{Sb}_2\text{O}_3 + \text{SnO}_2 + \text{CeO}_2$   
 $+ \text{Cl}^- + \text{F}^- + \text{SO}_4^{2-} \leq 1.5$ .

49. The glass according to Claim 48, wherein:  
said glass comprises a glass in which arsenic oxide, antimony oxide, and inherent impurities are minimized.

50. The glass according to Claim 49, wherein:  
said glass comprises a float glass.

51. The glass according to Claim 20, comprising at least one of (a.), (b.), (c.), (d.), (e.), (f.), (g.), (h.), and (i.), wherein (a.), (b.), (c.), (d.), (e.), (f.), (g.), (h.), and (i.) comprise:  
(a.) a glass transition temperature  $T_g$  of  $> 700^\circ\text{C}$  to maximize heat resistance of said glass;  
(b.) a glass having (i.) and (ii.), wherein (i.) and (ii.) are:  
(i.) a processing temperature,  $V_A$ , of  $\leq 1350^\circ\text{C}$  at  $10^4$  dPas;

and

(ii.) a temperature of  $\leq 1720^{\circ}\text{C}$  at  $10^2$  dPas  
(c.) more than 8% by weight of  $\text{B}_2\text{O}_3$ ;  
(d.) one of: at least 18% by weight of  $\text{Al}_2\text{O}_3$ , more than 18% by weight of  $\text{Al}_2\text{O}_3$ , at least 20.5% by weight of  $\text{Al}_2\text{O}_3$ , and at least 21.5% by weight of  $\text{Al}_2\text{O}_3$ ;

(e.) at least 0.1% by weight of  $\text{ZnO}$ ;

(f.) additionally (in % by weight):

$\text{ZrO}_2$  0 - 2

$\text{TiO}_2$  0 - 2

with  $\text{ZrO}_2 + \text{TiO}_2$  0 - 2

$\text{As}_2\text{O}_3$  0 - 1.5

$\text{Sb}_2\text{O}_3$  0 - 1.5

$\text{SnO}_2$  0 - 1.5

$\text{CeO}_2$  0 - 1.5

$\text{Cl}^-$  0 - 1.5

$\text{F}^-$  0 - 1.5

$\text{SO}_4^{2-}$  0 - 1.5

with  $\text{As}_2\text{O}_3 + \text{Sb}_2\text{O}_3 + \text{SnO}_2 + \text{CeO}_2$

$+ \text{Cl}^- + \text{F}^- + \text{SO}_4^{2-} \leq 1.5$ ;

(g.) a glass in which arsenic oxide, antimony oxide, and inherent impurities are minimized;

(h.) a float glass; and

(i.) one of (I.) and (II.):

(I.) a coefficient of thermal expansion  $\alpha_{20/300}$  of from  $2.8 \times 10^{-6}/\text{K}$  to  $3.6 \times 10^{-6}/\text{K}$ ; and

(II.) a density,  $\rho$ , of  $< 2.600 \text{ g/cm}^3$ . --